

(19) World Intellectual Property Organization  
International Bureau

PCT

(43) International Publication Date  
9 September 2005 (09.09.2005)(10) International Publication Number  
WO 2005/083525 A3(51) International Patent Classification:  
**G03F 7/20** (2006.01)Eindhoven (NL). **LEEUWESTEIN, Adriaan** [NL/NL];  
c/o Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL).(21) International Application Number:  
PCT/IB2005/050496(74) Agents: **ELEVLD, Koop, J.** et al.; Prof. Holstlaan 6,  
NL-5656 AA Eindhoven (NL).

(22) International Filing Date: 8 February 2005 (08.02.2005)

(81) Designated States (unless otherwise indicated, for every  
kind of national protection available): AE, AG, AL, AM,  
AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,  
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,  
GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE,  
KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD,  
MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG,  
PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY,  
TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU,  
ZA, ZM, ZW.

(25) Filing Language: English

(84) Designated States (unless otherwise indicated, for every  
kind of regional protection available): ARIPO (BW, GH,  
GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM,  
ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),  
European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI,  
FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO,

(26) Publication Language: English

(30) Priority Data:  
04100696.6 23 February 2004 (23.02.2004) EP

[Continued on next page]

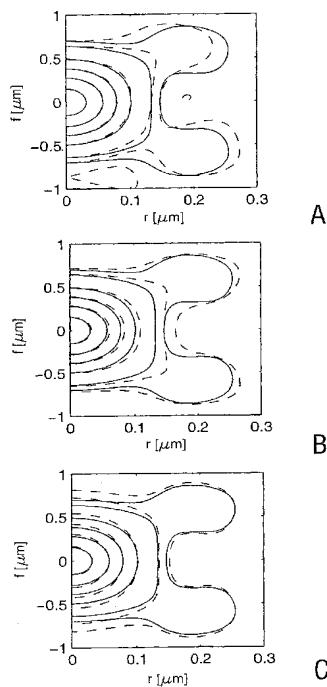
(71) Applicant (for all designated States except US): **KONINKLIJKE PHILIPS ELECTRONICS N.V.** [NL/NL];  
Groenewoudseweg 1, NL-5621 BA Eindhoven (NL).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **DIRKSEN, Peter**  
[NL/NL]; c/o Prof. Holstlaan 6, NL-5656 AA Eindhoven  
(NL). **JANSSEN, Augustus, J., E., M.** [NL/NL]; c/o Prof.  
Holstlaan 6, NL-5656 AA Eindhoven (NL). **BRAAT, Josephus, J., M.** [NL/NL]; c/o Prof. Holstlaan 6, NL-5656 AA

(54) Title: DETERMINING IMAGE BLUR IN AN IMAGING SYSTEM

**(57) Abstract:** The invention relates to a method of determining a parameter relating to image blur in an imaging system (IS) comprising the step of illuminating an object having a test pattern (MTP) by means of the imaging system (IS), thereby forming an image of the test pattern. The test pattern (MTP) has a size smaller than the resolution of the imaging system (IS), which makes the image of the test pattern independent of illuminator aberrations. The test pattern (MTP) is an isolated pattern, which causes the image to be free of optical proximity effects. The image is blurred due to stochastic fluctuations in the imaging system and/or in the detector detecting the blurred image. The parameter relating to the image blur is determined from a parameter relating to the shape of the blurred image. According to the invention, resist diffusion and/or focus noise may be characterized. In the method of designing a mask, the parameter relating to the image blur due to diffusion in the resist is taken into account. The computer program according to the invention is able to execute the step of determining the parameter relating to the image blur from a parameter relating to a shape of the blurred image.



WO 2005/083525 A3



SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

(88) Date of publication of the international search report:  
18 May 2006

**Declaration under Rule 4.17:**

- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

**Published:**

- *with international search report*

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*